

Indian Journal of Geo Marine Sciences  
Vol. 48 (03), March 2019, pp. 286-287

## Mutualistic interactions of polychaete, barnacles, mollusca and sea anemone with hermit crab

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Received 08 August 2017; revised 09 January 2018

This corresponding report gives a preliminary description of several most typical symbiotic communities formed in association with large subtidal hermit crabs in the Bay of Bengal coastal waters of the West Bengal, India. The mutualistic interactions of different animals with hermit crabs is presented. Localization on the host and possible competitive relationships with other symbionts are described for the number of model species of macrosymbionts.

[**Keywords:** Macrosymbionts; Hermit-crabs; West Bengal; Mutualistic interactions]

### Introduction

Representatives of the superfamily Paguroidea (Crustacea, Decapoda, Anomura), or hermit crabs, are a group of decapod crustaceans with soft asymmetrical abdomen, usually hidden in shells of gastropod mollusks (gastropods), sponges or wreck of a sunken tree<sup>1</sup>. More than 800 species of hermit crabs have been described, from terrestrial to deep-sea habitats worldwide. In fact, due to use of their gastropod shells, whole communities are found associated with hermit crabs. The communities include species that attach to the shells (inside and outside), bore into the shells, live within the lumen of the shells, and attach to the hermit crabs themselves (either as commensals or as parasitic species). Environmental characteristic, localization and occurrence in different types of symbiotic communities of five species of macrosymbionts, namely *Indothais lacera*, *Neverita didyma*, *Turricula javana*, *Polinices mammilla* and *Lepidonotus squamatus*, are presented. In this present paper, we argue that associated symbiotic community is very important to the life of hermit crabs.

### Materials and Methods

The study of mutualistic interactions of polychaete, barnacles, mollusca and sea anemone with hermit

crab was observed along the coastal region of Digha (21.68°N; 87.55°E) which is located East Coast of India. The specimens of this mutualistic interaction of *Indothais lacera*, *Neverita didyma*, *Turricula javana*, *Polinices mammilla* and *Lepidonotus squamatus* were preserved in personal collection and deposited at the Marine Aquarium and Regional Centre, Zoological Survey of India, Digha, West Bengal, India.

### Results and Discussion

The behavior of hermit crabs in tide-pools has often caught the attention and imagination of children (who are often quick to recognize interesting associates such as “snail fur” or colonial hydroids), yet investigations of the symbiotic relationships among the species in these communities are lacking<sup>2</sup>. Hermit crabs are some of the most conspicuous and ecologically important members of intertidal and sub-tidal marine habitats<sup>3,4</sup>. Among the symbionts of hermit crabs, nearly all major taxa of marine animals have been observed from microscopic protozoa to large polychaetes whose length can exceed the length of the host<sup>5-7</sup>. Polynoidae is one of the largest polychaete families, occupying a variety of marine habitats from sandy bottoms to calcareous substrates worldwide. Arthropods, flatworms/scale worms and polychaetes are mostly found free-living within the

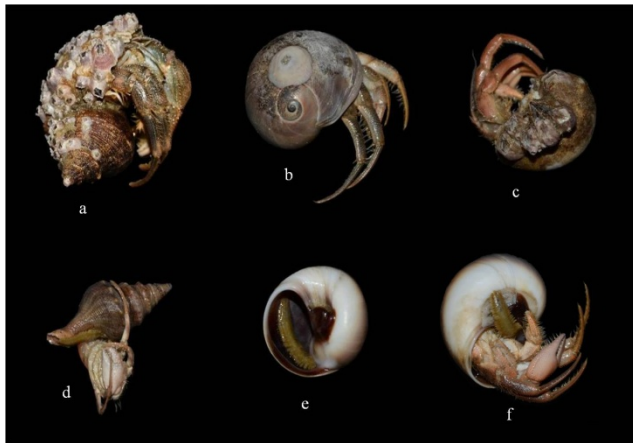


Fig. 1 — Symbionts associated with the hermit crab, a. *Indothis lacera*, b & c. *Neverita didyma*, d. *Turricula javana*, e. *Polinices mammilla*, f. *Lepidonotus squamatus* from the east coast of the West Bengal, India.

lumen of inhabited shells. Almost all cnidarians, bryozoans and sponges are found attached externally. Approximately 100 species of polychaetes are associated with hermit crabs, 26 of which are endolithic. Some of these species benefit hermit crabs by alleviating the need of the host to switch into new shells as they grow because the epibionts grow with them. The protozoans are unique in containing mostly species that live on the hermit crab hosts. Boring and fouling species negatively impact hosts by reducing shell strength and thus making hosts more susceptible to predation by shell crushing predators such as crabs<sup>8-10</sup>. The diversity of communities associated with hermit crabs remains poorly studied for most host species.

The number of symbionts associated with individual hermit crabs can reach 120 species in the best-studied cases (Fig. 1). Hermit crabs and sea anemones share an unusual and intimate underwater relationship. Young hermit crabs will often pick up a young sea anemone to attach to their shell and they become partners for life. Some sea anemones have gone so far as to cover most of the surface of the hermit crab shell so when the crab eventually outgrows the shell, he does not have to move. The relationship of the hermit crab and sea anemones serves both a multitude of purposes. Hermit crabs and sea anemones have a symbiotic relationship, meaning

they live in harmony together. A stable connection that sidesteps the typical prey and predator relationship found in nature. The hermit crab gains protection from predators by its relationship with the sea anemone<sup>1</sup>. In this corresponding report, we argue that associated symbiotic community is very much important to the life of hermit crabs.

### Acknowledgement

Authors are thankful to Dr. Kailash Chandra, Director, Zoological Survey of India, Ministry of Environment, Forest and Climate Change, Government of India, for providing necessary facilities for the work.

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